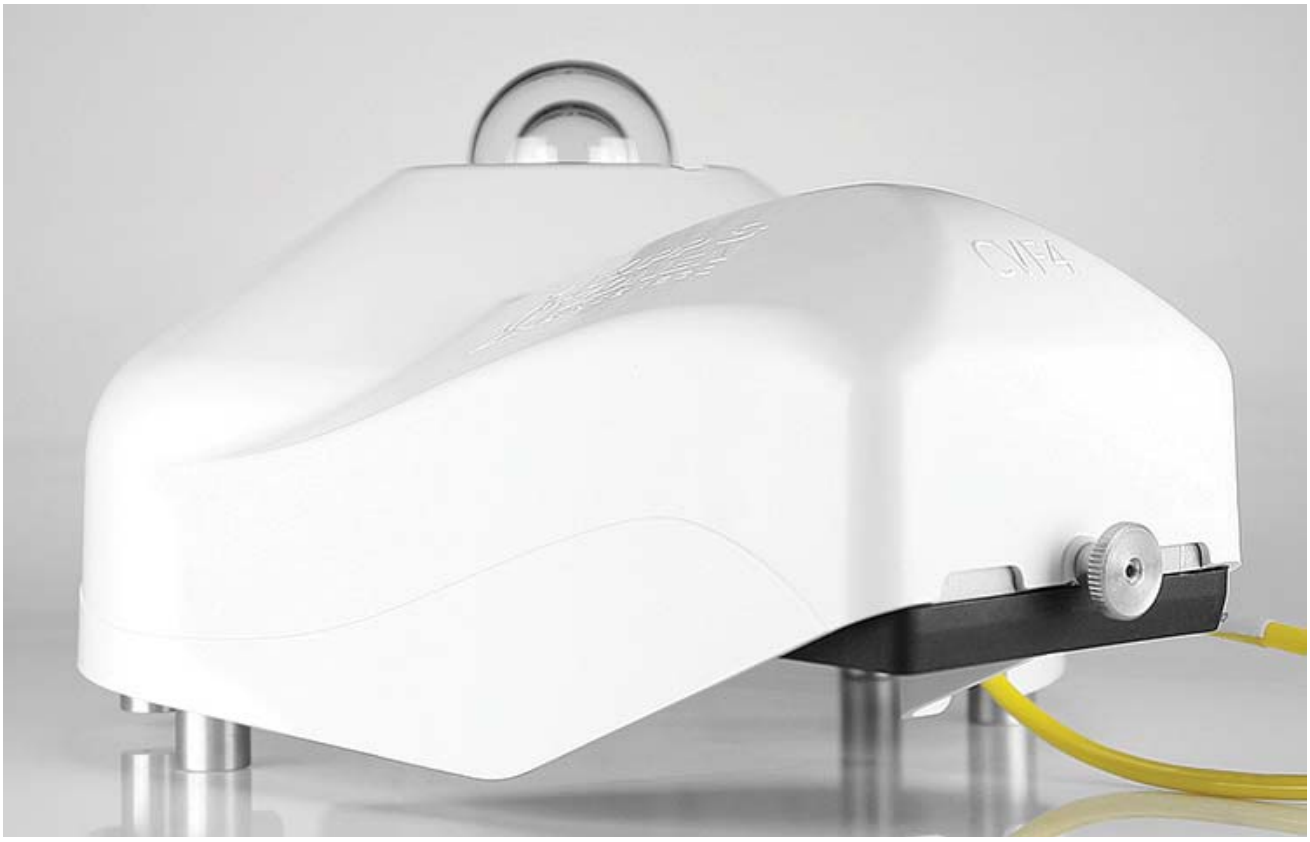
KIPP & ZONEN
SINCE 1830



Instruction Manual

CVF4 Ventilation Unit

Revision March 2014

WARRANTY AND ASSISTANCE

This equipment is warranted by CAMPBELL SCIENTIFIC (CANADA) CORP. ("CSC") to be free from defects in materials and workmanship under normal use and service for **twenty-four (24) months** from date of shipment unless specified otherwise. ***** **Batteries are not warranted.** ***** CSC's obligation under this warranty is limited to repairing or replacing (at CSC's option) defective products. The customer shall assume all costs of removing, reinstalling, and shipping defective products to CSC. CSC will return such products by surface carrier prepaid. This warranty shall not apply to any CSC products which have been subjected to modification, misuse, neglect, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose. CSC is not liable for special, indirect, incidental, or consequential damages.

Products may not be returned without prior authorization. To obtain a Return Merchandise Authorization (RMA), contact CAMPBELL SCIENTIFIC (CANADA) CORP., at (780) 454-2505. An RMA number will be issued in order to facilitate Repair Personnel in identifying an instrument upon arrival. Please write this number clearly on the outside of the shipping container. Include description of symptoms and all pertinent details.

CAMPBELL SCIENTIFIC (CANADA) CORP. does not accept collect calls.

Non-warranty products returned for repair should be accompanied by a purchase order to cover repair costs.

CAMPBELL® SCIENTIFIC

Campbell Scientific (Canada) Corp.
14532 131 Avenue NW | Edmonton AB T5L 4X4
780.454.2505 | fax 780.454.2655 | campbellsci.ca

Important User Information

Dear customer, thank you for purchasing a Kipp & Zonen product. It is essential that you read this manual completely for a full understanding of the proper and safe installation, use, maintenance and operation of your new CVF4 Ventilation Unit.

We understand that no instruction manual is perfect, so should you have any comments regarding this manual we will be pleased to receive them at:

Kipp & Zonen B.V.
Delftechpark 36, 2628 XH Delft, - or
P.O. Box 507, 2600 AM Delft,
The Netherlands

T: +31 (0) 15 2755 210
F: +31 (0) 15 2620 351
support@kippzonen.com
www.kippzonen.com

Warranty and liability

Kipp & Zonen guarantees that the product delivered has been thoroughly tested to ensure that it meets its published specifications. The warranty included in the conditions of delivery is valid only if the product has been installed and used according to the instructions supplied by Kipp & Zonen.

Kipp & Zonen shall in no event be liable for incidental or consequential damages, including without limitation, lost profits, loss of income, loss of business opportunities, loss of use and other related exposures, however incurred, arising from the incorrect use of the product.

Modifications made by the user may affect the instrument performance, void the warranty, or affect the validity of the CE declaration or other approvals and compliances to applicable International Standards.

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Kipp & Zonen reserves the right to make changes to this manual, brochures, specifications and other product documentation without prior notice.

Manual document number: V1403
Publication date: 1st March 2014

Declaration of Conformity

CE

We **Kipp & Zonen B.V.**
Delftechpark 36, 2628 XH Delft
P.O. Box 507, 2600 AM Delft
The Netherlands

Declare under our sole responsibility that the products:

Models **CVF4**
Type **Ventilation Unit**

to which this declaration relates are in conformity with European Harmonised Standards as published in:
Official Journal of the EC, Issue: 89/336/EEC 73/23/EEC

The compliance of the product has been based on:
Emissions **EN 61326-1:2000**
Immunity **EN 61326-1:2000**
Safety **EN 61010-1:2001**
Radio part **NA**

following the provisions of the directives (if applicable):
EMC-directive **2004/108/EC**
Electrical safety **2005/65/EC**

Following the provisions of the directive.

Delft, 1st March 2014

B.A.H. Dieterink
President
Kipp & Zonen B.V.

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1. Introduction

This manual will show you how to install, use and maintain the CVF4 Ventilation Unit. The CVF4 is meant for ventilating solar radiation sensors with the purpose to keep the mounted radiometer window or dome clean from dew, precipitation and pollution. It can be used outdoors under all-weather conditions. The CVF4 has a built in heater to keep the air just above ambient temperature.

Both the World Meteorological Organisation (WMO) and the Baseline Surface Radiation Network (BSRN) guidelines advise using a ventilator to optimise the performance of radiometers in general.

The use of the CVF4 will:
- Increases the maintenance interval.
- Increase the accuracy of the measured data (cleaner dome / window)
- Reduce the zero offset of the radiometer.

The CVF4 is meant for all CM, CMP, SMP, CG, CGR and CUV radiometers. However with the CMP 3 and SMP3 and CGR 3 the ventilation effect will be less due to the larger opening around the dome. The CVF4 is meant to run continuously. The heater can either be switched on permanently for cold regions or be switched by a data logger or clock to remove dew in the morning and be switched off afterwards. In that case the heater is operated from a 2 hours before sunrise to an hour after sunrise. This saves power in situations where power is limited such as PV operated sites.

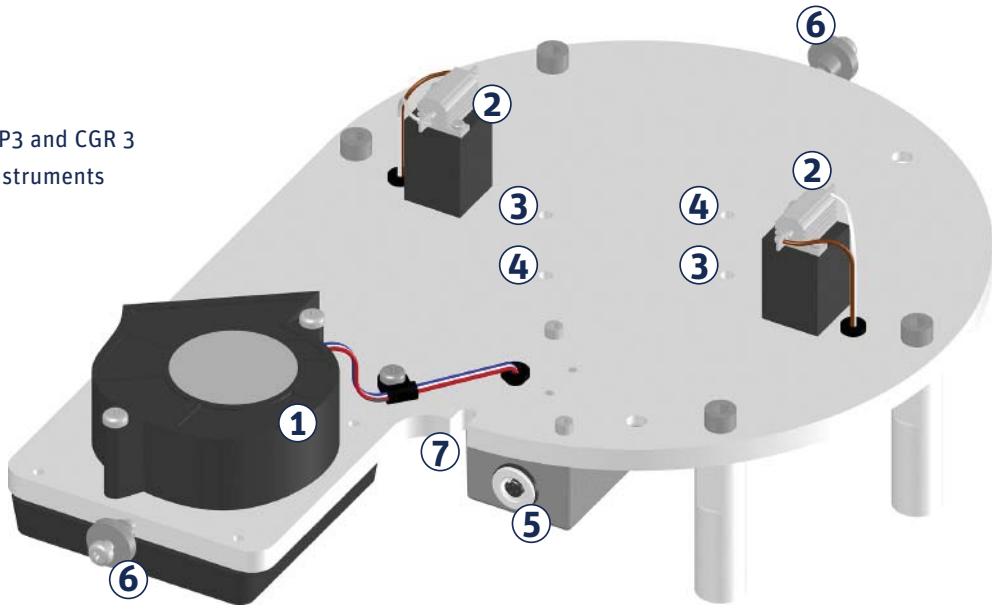
This manual, together with the instruction sheet, give information related to installation, maintenance, product specifications and trouble shooting of the CVF4.

If any questions should remain, please feel free to contact your Kipp & Zonen dealer or e-mail: info@kippzonen.com.

For information about other Kipp & Zonen products or to check for any update of this manual, go to **www.kippzonen.com**.

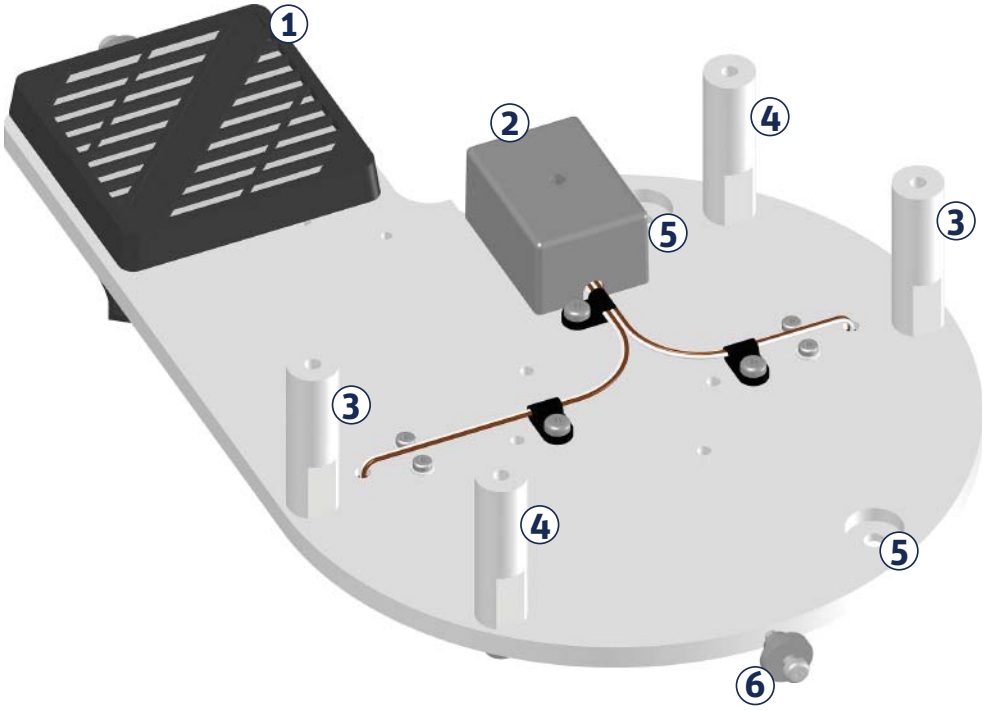
1.1 CVF4 top side

① Ventilator
② Heater
③ Mounting holes CMP 3, SMP3 and CGR 3
④ Mounting holes all other instruments
⑤ Connector
⑥ Cover nut
⑦ Slit for radiometer cable



1.2 CVF4 bottom side

① Filter cover
② Connector box
③ Mounting feet for SOLYS 2 / Feet for stabilisation
④ Feet for stabilisation / Mounting feet for 2AP
⑤ Mounting holes for mounting feet on CM 121C shadow ring adapter
⑥ Cover nut



2. Installation

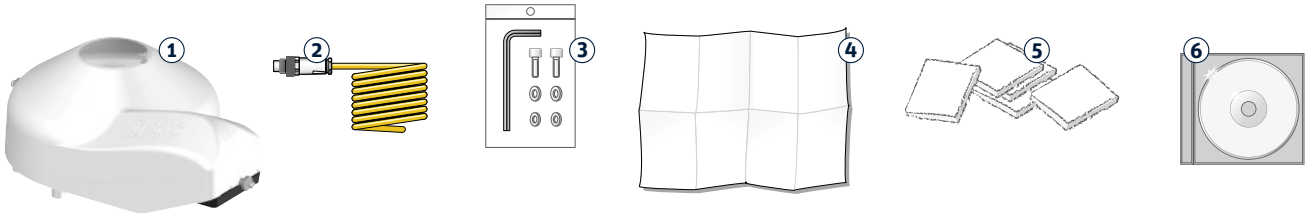
The CVF4 consists of:

- Base plate with ventilator, heater and connector
- Replaceable filter plus cover
- Top cover

2.1 Included with the product

The following items are included with the CVF4 ventilation unit:

① Ventilation Unit
② Cable, pre-wired with 4 pins connector or connector only for customer cable
③ Fixing kit with screws, washers and Allan key
④ Instruction sheet
⑤ Pack of 5 spare ventilation fan inlet filters
⑥ Product Documentation CD



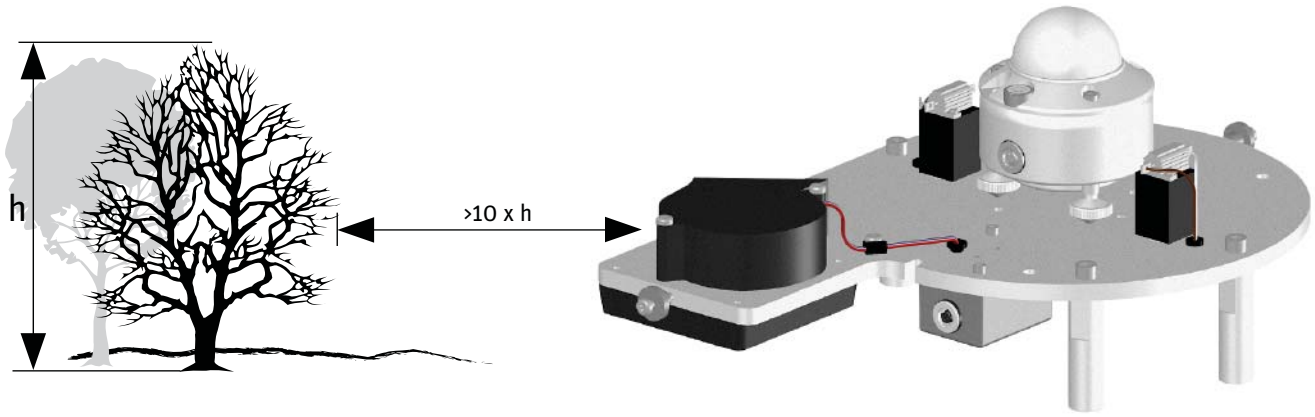
For optional accessories see chapter 3.

2.2 Tools required

If the CVF4 is mounted with the supplied screws only the supplied Allan key is required. Make sure there is space to fasten the screw under the bottom of the plate. To fasten the radiometers other Allan keys or screwdrivers may be necessary.

2.3 Preparation

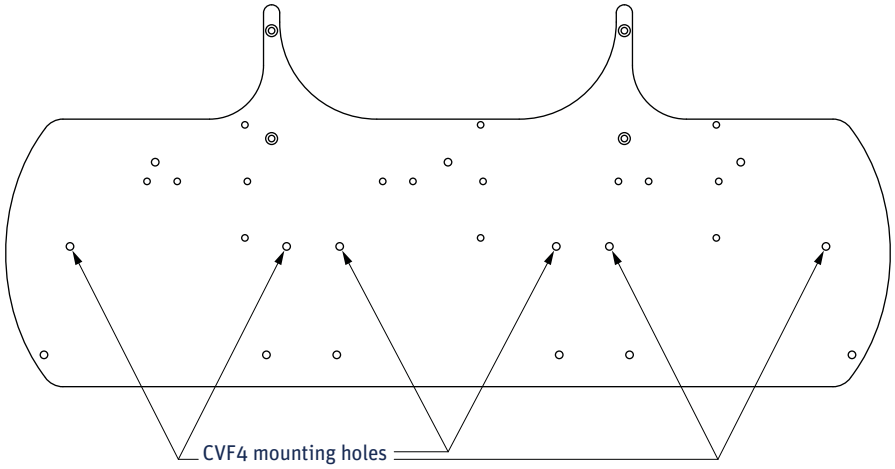
Like for any radiometer with 360 ° field of view, make sure there are no obstructions that are higher than ten times their distance when selecting a location for the CVF4.



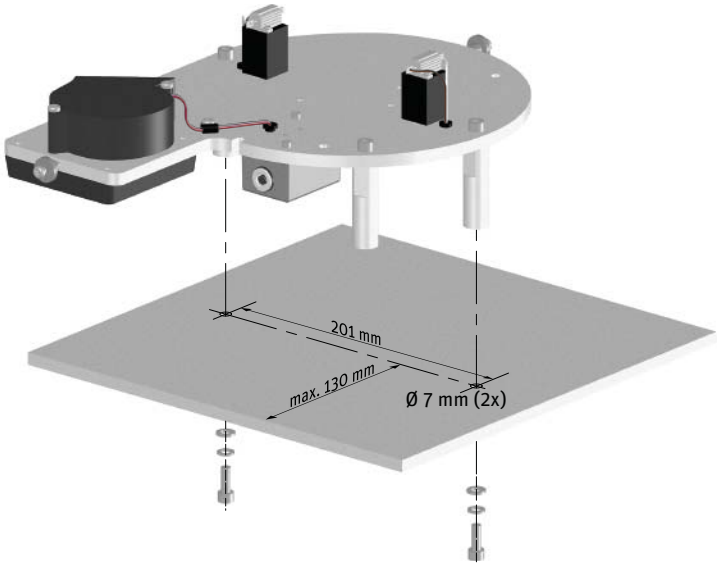
2.4 Installation procedure

First the CVF4 is screwed flat on its mounting plate. In case the CVF4 is mounted on a solar tracker, the tracker has to be levelled first.

On our sun trackers the CVF4 is positioned such that the fan sticks out over the edge of the plate. This ensures the air inlet is never blocked (see picture of the CVF4 on the SOLYS 2 Sun Tracker on the next page). The locations of the CVF4 mounting holes on the SOLYS 2 top mounting plate are shown below.

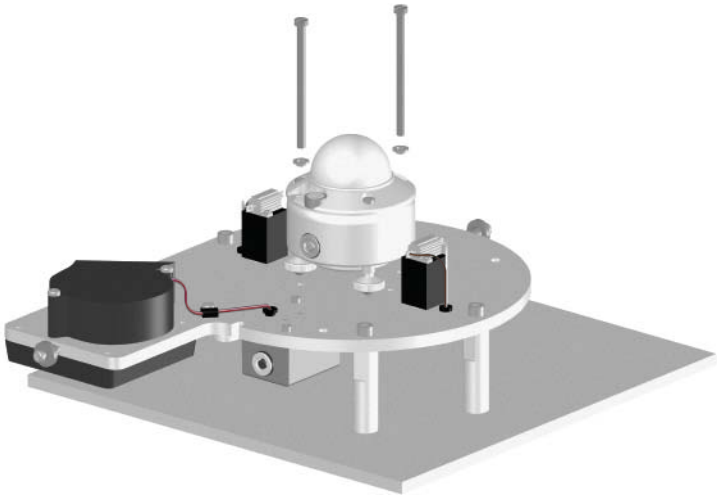


When using your own mounting plate, make sure the CVF4 is mounted in the same way with the fan sticking out. The CVF4 mounting holes size and distances are indicated in the drawing below.



The CVF4 is mounted with the supplied 4 washers and 2 screws through mounting plates from 4 to 8 mm thick. The other 2 feet are for stability but do not need screws.

Then the radiometer is mounted in the CVF4 and levelled with its own levelling feet. Afterwards the radiometer mounting screws and shoulder washers are fitted (not secured yet).

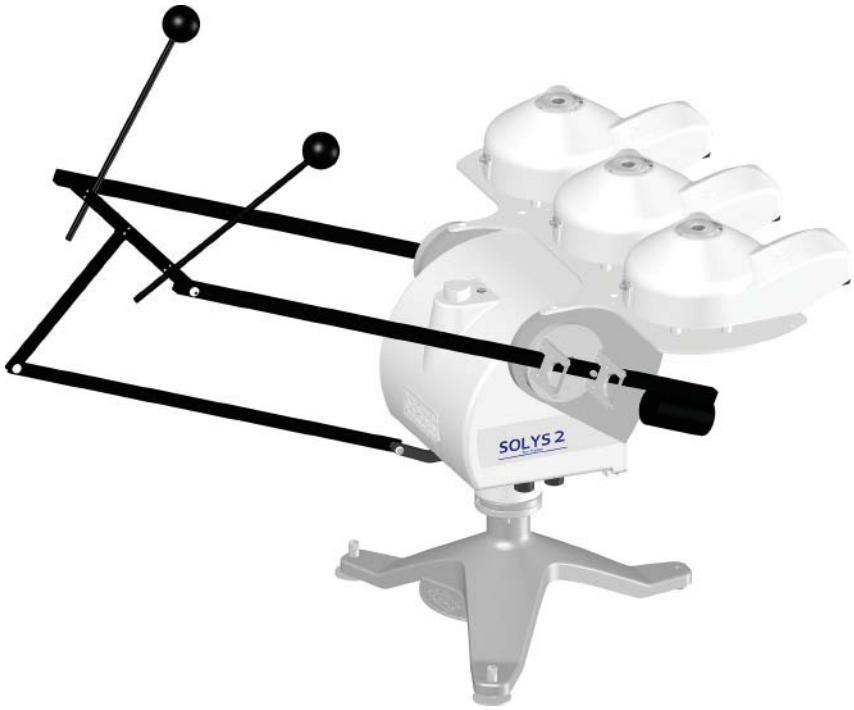


In case the CVF4 is mounted on a solar tracker, finish the alignment of the tracker first before securing the radiometer screws because tracker (and radiometer) levelling might need re-adjustment.

After all mounting screws have been secured the cables of the CVF4 and the radiometer can be connected. The radiometer cable goes (down) through the slit in the CVF4 base plate.

Finally the CVF4 cover can be put on and the two cover nuts can be fastened.

Make sure the cover is horizontal (check equal space around the radiometer dome) and the two cover nuts are fastened hand tight.

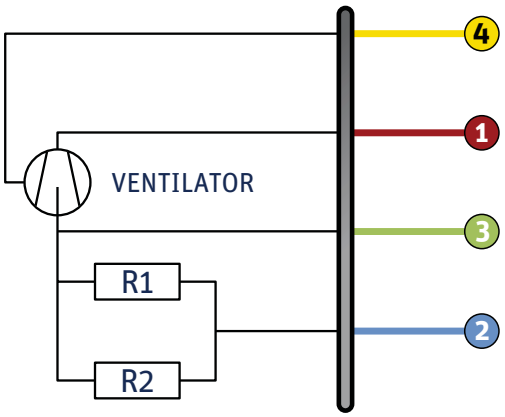


SOLYS 2 with top mounting plate and 3 x CVF4

SOLYS 2 with small top mounting plate with CVF4

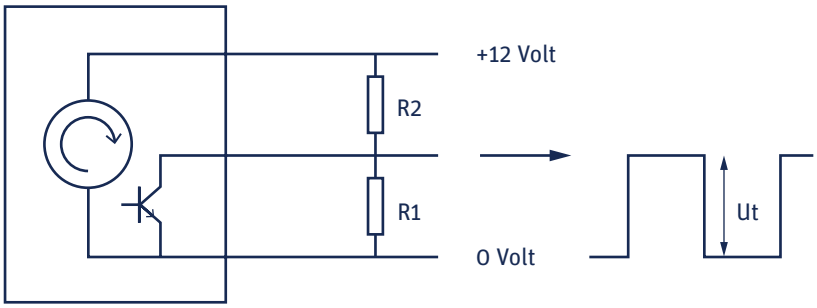
2.5 Electrical connections

VENTILATION UNIT CONNECTION ANSCHLUSS • RACCORDEMENT • CONEXIÓN			
	Wire Kabel Fil Cable	Function Funktion Fonction Función	Connect with Anschluss an Relier à Conectar con
1	Red Rot • Rouge • Rojo	+ Ventilator + Ventilator + Ventilateur + Ventilador	+12 VDC @ 0.4 A
2	Blue Blau • Bleu • Azul	+ Heater + Heizung + Chauffage + Calentador	+12 VDC @ 0.5 A
3	Green Grün • Vert • Verde	Power supply Spannungsversorgung Alimentation Fuente de alimentación	12 VDC ground, tacho ground Erde Terre Tierra
4	Yellow Gelb • Jaune • Amarillo	5 V tacho output	+ Hi
	Shield Abschirmung Protection Malla	Housing Gehäuse Boîte Cubierta	Ground Erde Terre Tierra
* Connect to ground if radiometer not grounded Mit Erde verbinden, wenn das Radiometer nicht geerdet ist Reliez à la terre si le radiomètre n'est pas connecté Conectar a tierra si el radiómetro no lo está			



The CVF4 has a 4 wire cable for connecting the 12 VDC to the ventilator and heater. The ground is common for the ventilator, heater and the tacho output.

The tacho output (Ut in diagram below, pin 4, yellow wire) provides a 5 Volt signal that gives two pulses per revolution. It can be connected to a data logger to (remotely) check proper operation of the CVF4. The tacho output uses the same power supply ground (pin 3, green wire).



The nominal speed is 4400 rpm, resulting in 8800 pulses per minute which equals 146 Hz on the tacho output.

Changes often indicate pollution of the filter (higher frequency), or mechanical problems with ventilator (lower frequency).

If sufficient power is available it is advised to use the heater in combination with the ventilator even in warm climates. The heater will prevent deposition of dew in the morning.

3. Accessories

3.1 Spare CVF4 filters

Article number 2682047

Set of 5 spare ventilation fan inlet filters.

3.2 Power supply

Two optional 12 VDC power supplies are available for outdoor (CVP 1) and indoor (CVP 2) use.

3.2.1 CVP 1

Article number 0357700

The CVP 1 is a waterproof (IP 65) power supply for outdoor use with 12 VDC @ 3.5 A output.

The input is wide range 100 to 240 VAC, 50 or 60 Hz.

3.2.2 CVP 2

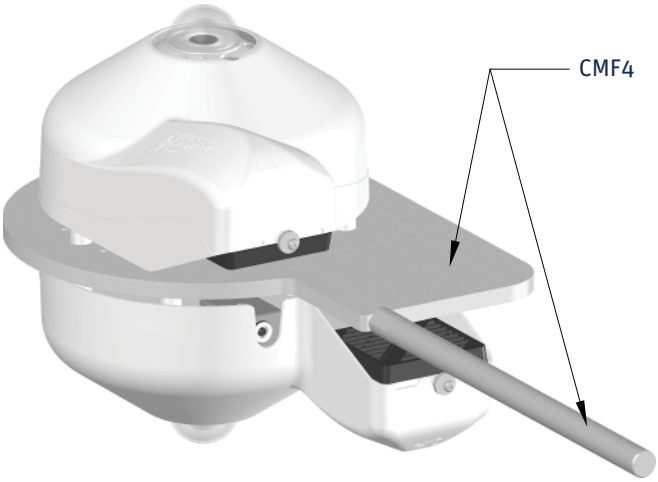
Article number 0349401

This is a 12 VDC, 2.5 A power supply for indoor use with a wide VAC input range of 110 to 230 VAC, 50 or 60 Hz. It comes with universal mains power plugs for Europe, UK, USA and Australia.

The DC output cable from the power supply unit are stripped and tinned wires, marked with a red sleeve on the + wire.

3.3 CMF4 Mounting Fixture

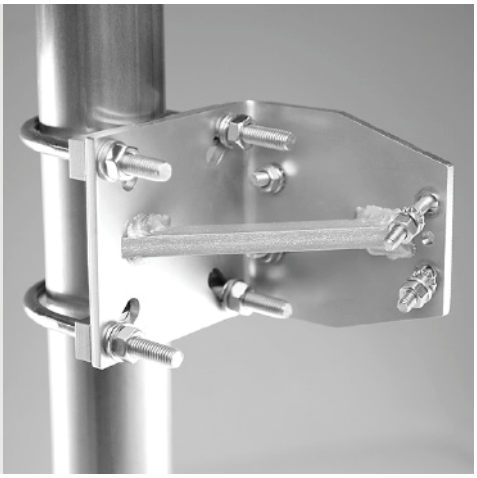
Article number 0362703



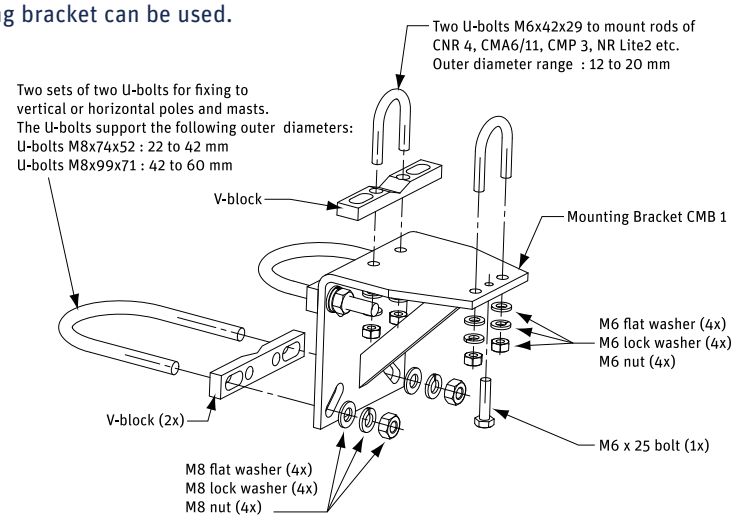
The CMF4 consists of a mounting plate plus rod. It can be used for one CVF4, looking up or 2 CVF4's where one is looking down. This allows for highly accurate albedo or net-radiation measurements with 2 ventilated radiometers.

3.4 CMB 1 Mounting Bracket

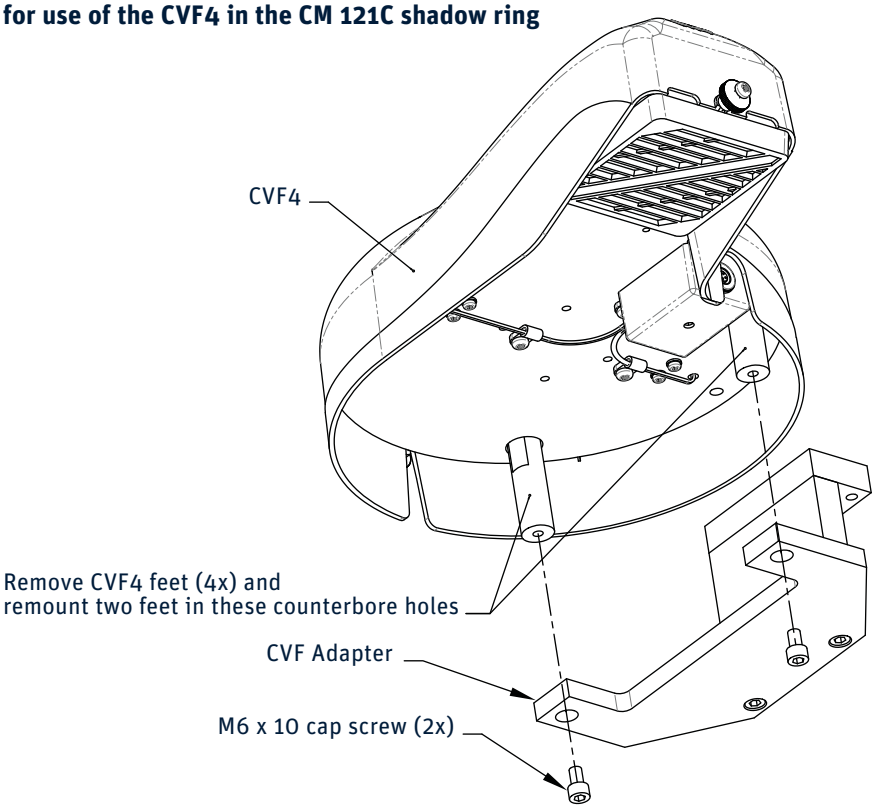
Article number 0369701



To mount the CMF4 to a mast or wall the CMB 1 mounting bracket can be used.


Two U-bolts M6x42x29 to mount rods of CNR 4, CMA6/11, CMP 3, NR Lite2 etc. Outer diameter range : 12 to 20 mm
Two sets of two U-bolts for fixing to vertical or horizontal poles and masts. The U-bolts support the following outer diameters: U-bolts M8x74x52 : 22 to 42 mm U-bolts M8x99x71 : 42 to 60 mm
V-block
Mounting Bracket CMB 1
M6 flat washer (4x)
M6 lock washer (4x)
M6 nut (4x)
V-block (2x)
M6 x 25 bolt (1x)
M8 flat washer (4x)
M8 lock washer (4x)
M8 nut (4x)

3.5 Adapter for use of the CVF4 in the CM 121C shadow ring



Relocation of 2 of the CVF4 mounting feet to fit it on the CM 121C shadow ring

The blue adapter part is included with the CM 121C.

CM 121B (Article number 0346900) is not supplied with, nor aligned for the CVF4 adapter (Article number 0346700)
CM 121C (Article number 0346901) is aligned for and supplied with the CVF4 adapter

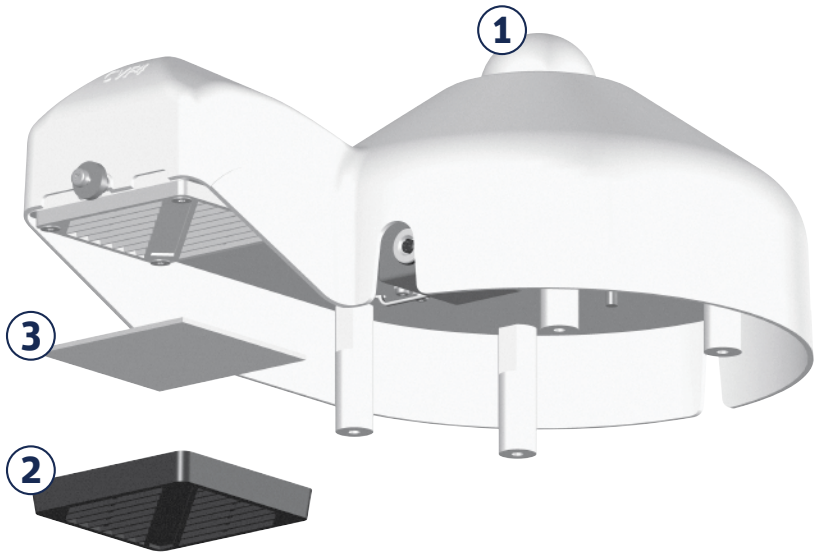
4. Maintenance

Regular inspection of the CVF4 is advised. Depending on the location (air pollution) this can be monthly or yearly. When on site for inspection of other instruments it is advised to check the CVF4 filter.

At the same time radiometer levelling and desiccant can be checked. For access to the desiccant the 2 mounting nuts have to be loosened and the top cover taken off.

When replacing the cover, make sure it is placed correctly. This can best be done by checking the opening around the radiometer, this should be evenly spaced.

Tip: When the tacho output is logged with the radiometer data, the performance of the ventilator can be remotely checked.



① Refer to radiometer instruction sheet for maintenance instructions.

② Regularly inspect the fan inlet by unclipping the cover.
For optimal air flow, make sure the diagonal line on the cover is in line with the ventilator part (see above drawing).
The filter cover clicks back on the ventilator.

③ Clean or replace filter every 6 months.
The interval strongly depends on the location and pollution of the air. Discolouration or pollution of the plastic cover will not affect the proper operation of the radiometer. (the radiometer can not 'see' the CVF4 cover). Cleaning of the cover can be done with water and a brush or cloth.

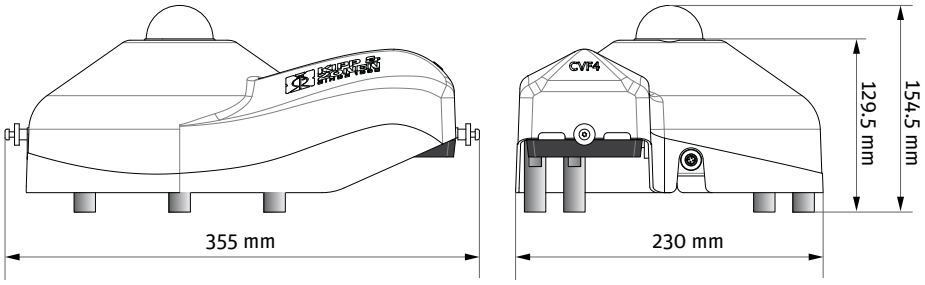
5. Specification

Kipp & Zonen reserves the right to make changes to specifications and other product documentation without prior notice.

5.1 Optical and electrical

Specifications	
Compatible instruments	CMP 6, CMP10, CMP 11, SMP11, CMP 21, CMP 22, CGR 4, CUV 5 CMP 3, SMP3 and CGR 3 with reduced specifications Older type single radiometers: CM, CG and CUV will also fit
Compliance with standards	ISO/TR 9901, BSRN operations manual
Power consumption ventilator (unheated)	5 W continuously at 12 VDC
Power consumption heater (selectable)	5.5 W at 12 VDC
Operational voltage range	8 to 13.5 V
Operational temperature range	-40 °C to +70 °C
Storage temperature range	-40 °C to +70 °C
Humidity range	0 to 100 % non-condensing
Ingress Protection (IP) rating	54
Tacho output	Two tacho pulses (5 Volt) per revolution, 8800 pulses per minute (nominal), 146 Hz
Standard cable length	10 m
Optional cable lengths	25 m and 50 m
Increase of air temperature	0.25 K at 0 W heating 1 K at 5.5 W heating
Zero offset A reduction	50% reduction for CMP's
Offset by heating	-2 W/m² at 5.5 W heating (CMP 11), no offset for CGR pyrgeometers
Cable resistance	0.16 Ω/m (2 x 0.08 Ω/m)
Voltage drop at maximum heating	0.075 V/m
Size	0.23 m diameter, length 0.355 m
Advantages	Easier filter access
	No build-up of snow under ventilator (hangs over mounting platform/located higher)
	Easy removal of cover
	Because of radial ventilator, 5x better circulation of air over the top of the dome
	Lower power consumption for both ventilator and heater with improved performance
	Wide operating voltage range
	High quality cable with very low voltage drop
Note: The performance specifications quoted are worst-case and/or maximum values	

5.2 Dimensions and weight



Weight without cable: 1.6 kg

6. Trouble shooting

Malfunction	Cause	Check
Ventilator and heater do not work	Power failure	Check 12 VDC and/or mains voltage
Ventilator does not work	Mechanical obstruction	Clean filter and/or remove obstruction
Ventilator does not work	Electrical failure	Check fan impedance ~30 Ω
Heater does not work	Resistor defective	Measure power resistors: Specifications: 15 Watt and 50 / 39 Ω

7. Customer support

If you require any support for your Kipp & Zonen product please contact your local representative in the first instance. The information can be found in the 'Contact' section of our website at **www.kippzonen.com**.

Alternatively, you can contact us directly at **www.kippzonen.com/support**

Please include the following information:

- Instrument model
- Instrument serial number
- Details of the fault or problem
- Examples of data files
- Readout device or data acquisition system
- Interfaces and power supplies
- History of any previous repairs or modifications
- Pictures of the installation
- Overview of the local environment conditions

Kipp & Zonen guarantees that your information will not be shared with other organisations.

KIPP & ZONEN
SINCE 1830

Our customer support remains at your disposal for any maintenance or repair, calibration, supplies and spares.

Für Servicearbeiten und Kalibrierung, Verbrauchsmaterial und Ersatzteile steht Ihnen unsere Customer Support Abteilung zur Verfügung.

Notre service 'Support Clientèle' reste à votre entière disposition pour tout problème de maintenance, réparation ou d'étalonnage ainsi que pour les accessoires et pièces de rechange.

Nuestro servicio de atención al cliente esta a su disposición para cualquier actuación de mantenimiento, reparación, calibración y suministro de repuestos.

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